Statement of Jonathan Lash
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To the
U.S. House of Representatives
Committee on Transportation and Infrastructure
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Mr. Chairman, distinguished members of the Committee, good morning and thank you for inviting me to testify about a matter of compelling national and global significance. I am Jonathan Lash, President of the World Resources Institute.

The World Resources Institute is a non-profit, non-partisan environmental think tank that goes beyond research to provide practical solutions to the world's most urgent environment and development challenges. We work in partnership with scientists, businesses, governments, and non-governmental organizations in more than seventy countries to provide information, tools and analysis to address problems like climate change, and the degradation of ecosystems and their capacity to provide for human well-being.

The Earth is warming, and the warming is caused, mostly part by human activities. The cheap plentiful fossil fuels that have enabled huge increases in human productivity and great improvements in human well being over the past 200 years together with significant deforestation have been the most important causes of global warming. The buildup of Carbon Dioxide and other so-called "green house gasses" (GHGs) is accelerating, and unless we act very soon to control emissions warming during our childrens' lifetimes will rise to very dangerous levels.

In February 2007, the Intergovernmental Panel on Climate Change (IPCC -the official science process sanctioned by the world's governments and participated in by the United States) released its report on climate change science. The report states that it is "unequivocal" that Earth's climate is warming, and confirms that the current atmospheric concentration of carbon dioxide and methane, two important greenhouse gases (GHGs), "exceeds by far the natural range over the last 650,000 years." Further, the IPCC concludes that it is now "very likely" (greater than 90% probability) that greenhouse gas emissions from human activities have caused "most of the observed increase in globally averaged temperatures since the mid-20th century."

Indeed, the impacts of warming have become increasingly evident to non-scientific observers. Sea ice in the Arctic is shrinking, Greenland's massive ice sheet in melting – far faster than predicted. Glaciers are rapidly shrinking from the Rockies to the Alps. There have been killer heat waves in Northern Europe and a 3 year drought in the Amazon. As oceans have warmed the number of category 4 and 5 hurricanes and typhoons (the most severe) increased from 171 in the 14 years from 1975 to 1989, to 369 in the 14 years from 1990 to 2004. Farmers and hunters across the United States report changing growing seasons and changing bird migration patterns.

Disturbing natural ecosystem cycles has economic, aesthetic and environmental consequences. An old pest, the Pine Bark Beetle, its numbers multiplied by longer summers and warmer

winters, has emerged to destroy forests that have been weakened by drought and warming in the west. In Utah, for example, the spruce beetle has infested more than 122,000 acres and killed over 3,000,000 spruce trees. This has resulted in 333 million to 500 million board feet of spruce saw timber lost annually. Similar losses have been recorded in Montana, Idaho and Arizona, and Alaska has lost over three billion board feet.

Those impacts are the effect of less than 1 degree Centigrade warming. But the emissions that cause warming are rising at an accelerating rate. Unfortunately, even if we act today to reduce emissions from cars, power plants, industrial facilities, and other sources, we will see some degree of continued warming because past emissions will stay in the atmosphere for decades or more.

While any level of warming may have consequences, many scientists believe we must limit global warming to no more than 2 degrees Celsius above current levels to avoid the worst impacts of climate change. To limit global warming to less than 2 degrees Celsius, it is believed that atmospheric carbon dioxide concentrations must not exceed 450-500 ppm (the current level is around 380 ppm and rising at more than 2 ppm per year). To achieve this, global emissions would need to decrease dramatically during this century, perhaps on the order of 60 to 80 percent below current levels by 2050.

We are already seeing what impacts may lie ahead. Storms the strength of Hurricane Katrina are more likely, and scientists tell us the rise in temperature is forecast to produce a number of significant impacts, including increasingly severe weather (such as prolonged droughts, more intense tropical cyclones, and extreme heat waves), continued melting of polar ice caps and glaciers, changes in water storage and water flow, rising sea levels, and unprecedented changes in ocean chemistry. These outcomes, in turn, would likely lead to loss of agricultural productivity, greater water scarcity, widespread habitat degradation, extinction of species, and inundation of coastal areas.

A few weeks ago, eleven retired admirals and generals issued a report on their review of the issue of global climate change. They also came to the conclusion that the evidence is sufficiently compelling and the consequences sufficiently grave to require substantially more analytical effort by the intelligence and defense community to mitigate and adapt to the potential threats. The general's report notes, for example, that 40 percent of the world's population gets at least half its drinking water from the summer melt of mountain glaciers that are rapidly disappearing. They state that climate change is "a threat multiplier for instability in some of the most volatile regions of the world", which will "seriously exacerbate already marginal living standards in many Asian, African and Middle Eastern nations, causing widespread political instability and the likelihood of failed states."

In the U.S. we are already experiencing decreased snow cover in the Northwest causing competition between human use, energy generation and ecosystem needs. Warmer temperatures are melting the permafrost in Alaska putting local communities, oil pipelines and species at risk. These trends will increase.

The IPCC projects that in 2039, average temperatures across North America are projected to rise by 1.8 to 5.4 degrees Fahrenheit. Half the U.S. population – approximately 150 million people

live in a coastal community. With sea levels rising in the US coast at a rate of .08-.12 inches each year, these communities are at risk. Armed with these statistics, insurers are now denying coverage to homeowners in the state of Florida, and rates are increasing elsewhere.

Water impacts may be significant in the U.S. Reduced rainfall will impact the Southwest, though rain will increase elsewhere and extreme precipitation events will make flooding more likely. Rivers with already strained resources, such as the Colorado River will be especially vulnerable to decreased water flow. In addition to changes in water level, warmer water will threaten fish – some species in the Washington DC area are already at the top of their tolerance ranges. Navigation in the central U.S. Gulf Coast will continue to be vulnerable to sea level rise and weather events.

The IPCC categorizes these types of impacts. Table 1 summarizes climate related impacts that are already being observed, and that are projected over the next century:

Table 1. Recent trends, assessment of human influence on the trend, and projections for extreme weather events for which there is an observed late 20th century trend

Phenomenon[a] and direction of trend	Likelihood that trend occurred in late 20th century (typically post 1960)	Likelihood of a human contribution to observed trend [b]	Likelihood of future trends based on projections for 21st century using SRES scenarios
Warmer and fewer cold days and nights over most land areas	*Very likely* [c]	*Likely* [e]	*Virtually certain* [e]
Warmer and more frequent hot days and nights over most land areas	*Very likely* [d]	*Likely (nights)* [e]	*Virtually certain* [e]
Warm spells / heat waves. Frequency increases over most land areas	*Likely*	*More likely than not* [f]	*Very likely*
Heavy precipitation events. Frequency (or proportion of total rainfall from heavy falls) increases over most areas	*Likely*	*More likely than not* [f]	*Very likely*
Area affected by droughts increases	*Likely* in many regions since 1970s	*More likely than not*	*Likely*
Intense tropical cyclone activity increases	*Likely* in some regions since 1970	*More likely than not* [f]	*Likely*
Increased incidence of extreme high sea level (excludes tsunamis) [g]	*Likely*	*More likely than not* [f, h]	*Likely* [i]

Source: IPCC 4th Assessment Report, February 2007

These current and projected impacts are largely due to the fact that worldwide emissions of GHGs have risen steeply in the past 60 years. About 42,000 Megatonnes of CO_2 were in the atmosphere in 2000 (the last year for which there is authoritative global emissions data). Global emissions of all greenhouse gases were up 7.5% from 1990-2000 (that number would be 10.4% except there was a substantial decrease in global deforestation rates which contribute to global warming). Electricity and heat represent 25% of the total global emissions, with land use change

and forestry the second source at 18% globally. In terms of economic activity, road transport was responsible for nearly 10% of global emissions.

U.S. emissions of GHGs come from every part of the economy, but certain sectors, and certain sources are key. In 2005 (the latest year for which U.S. data is available), total U.S. emissions were 7,241 Mt CO2 which represents a 16.3% increase over 1990. Within that total, transport emissions were approximately 26% - and were up 32% from 1990. There are three drivers for surface transport emissions:

- the number of vehicle miles traveled (VMT) which increased 39.4% between 1990 and 2005;
- gasoline consumption which increased 27% during this same period;
- and population growth which increased 15%

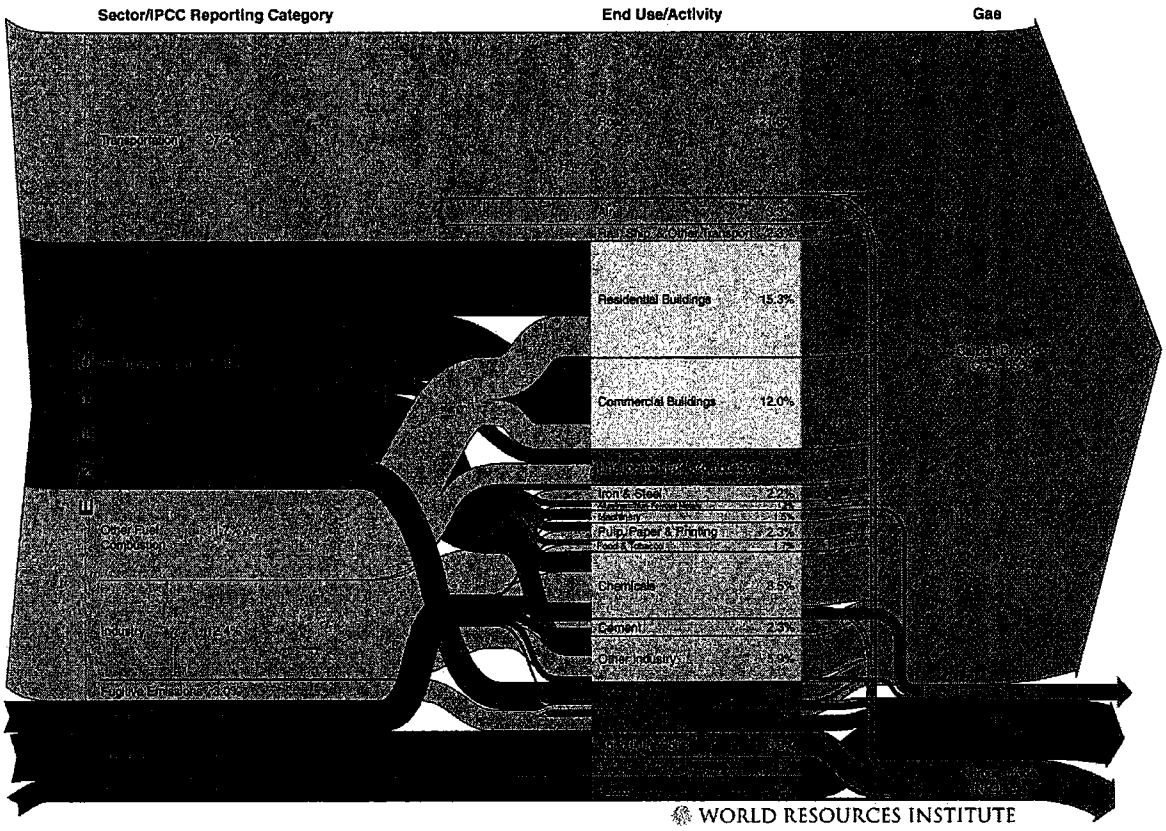
Buildings account for 38% of CO2 emissions in the United States - more than either the transportation or industrial sectors. In fact, according to the U.S. Green Building Council:

- Buildings consume 70 percent of the electricity load in the U.S.
- Over the next 25 years, CO2 emissions from buildings are projected to grow faster than any other sector, with emissions from commercial buildings projected to grow the fastest at 1.8% a year through 2030
- Buildings have a life span of 50-100 years, during which they continually consume energy and produce CO2 emissions. If half of new commercial buildings were built to use 50 percent less energy, it would save over 6 million metric tons of CO2 annually for the life of the buildings - the equivalent of taking more than 1 million cars off the road every year.

Chart 1 is a flow chart that looks at how emissions move through the U.S. economy. It tracks the sector responsible for emissions, and the end user as well as providing a breakdown by GHG of what is emitted as a result of these activities.

Chart 1:

U.S. GHG Emissions Flow Chart



Thus, for the United States, the core of the problem of reducing emissions is cars, coal, and buildings. We know that the choices we make today about the infrastructure we build and maintain will profoundly affect the emissions trajectory we are on. This is a matter of moving beyond decades old technologies for generating electricity, powering automobiles, and creating comfortable, well lit, and attractive spaces for Americans to live and work in.

The scientific debate on the cause of global climate change is basically over - the focus has turned to action. It is essential that the US take strong action at the national level to reduce emissions. The rest of the world cannot solve this problem without the US. Action by the US will make clear that in tomorrow's markets there will be a price for carbon, and will give US companies an advantage in preparing to compete in those markets.

That is why twenty two leading U.S. businesses including large energy consumers and customers such as General Electric, AIG, Alcoa, Caterpillar, DuPont, John Deere, Duke Energy, and General Motors joined with WRI and five environmental organizations to urge Congress to enact mandatory policy measures to "slow, stop and reverse" the growth in US GHG emissions. The United States Climate Action Partnership (US CAP) on January 22, 2007, issued "A Call for Action" which provided recommendations to Congress and the Administration on mandatory, economy-wide policy design to achieving a cap and trade program with step-wise emissions reduction of between 10-30% within 15 years of rapid enactment with a long term goal of reducing U.S. emissions by 60-80% by 2050.

We'll turn to the leadership role needed by your committee and Congress in a moment. Let's look at what we know about how to reduce emissions.

According to the International Energy Agency, the world will spend $20 trillion on new energy infrastructure in the coming decades (and approximately $4 trillion in North America alone). If those investments are made in old fossil fuel-based technologies, the opportunity to prevent dangerous climate change will be lost.

The solution is a shift in energy technology development and deployment at an unprecedented rate. The change in technology must affect the three primary uses of energy – power, transportation, and heating – all basic elements to modern life, whether in industrialized or developing economies. The catalysts for this shift are straightforward: government policy and private sector investment. Importantly, the transformation of the energy sector to a diversified, low-carbon system need not be an economic hardship. Rather, it offers an opportunity to manufacture and develop cutting-edge technologies that will clean the air, improve people's health, and provide greater economic and political stability.

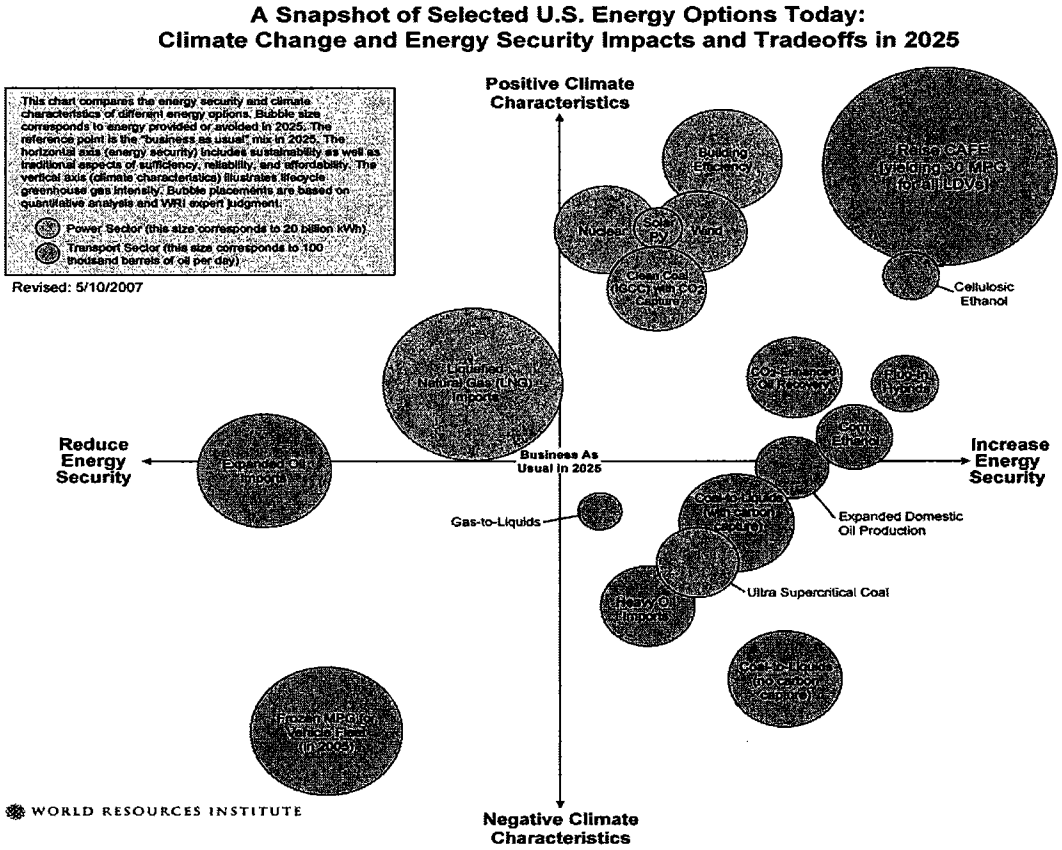
Table 2 provides a sense of the types of policy action required immediately and over the long term by sector.

Table 2: Policy outcomes required to achieve reductions

Sector	Near Term Priorities	Medium term Priorities	Long term priorities
Power	Avoid lock-in of conventional coal by setting performance standards and a creating a price on carbon through tax or cap and trade program	Post-combustion CCS Renewable energy at scale	Pre-combustion CCS Renewable energy at scale
Buildings	Avoid lock-in of inefficient buildings Energy efficiency	Carbon neutral building design	Net zero buildings
Transport	Avoid lock-in of inefficient infrastructure Increase efficiency	Sustainable fuel systems Vehicle innovation Advanced mass transit	Zero emission vehicles
Industry	Avoid lock-in of inefficient production	Advanced industrial production	Low emission industrial production
Land Use	Slow deforestation	Enhance sinks, change Ag practices	

The U.S. Congress faces a variety of policy and technology choices as it reviews energy security and climate change issues. However, not all options are created equal, and choices made in the name of energy security may have significant and detrimental impacts on the climate. The trade-offs are calculated and represented in **Chart 2**, below.

Chart 2: Energy Technology choices and security and climate impacts



The chart looks at U.S. energy options today and calculates and compares selected energy technology options and the impacts these technology choices would have on our relative energy security and climate performance in 2025.

As you can see, energy technologies in the upper right quadrant have a positive impact on climate change and energy security, while those in the lower left have a negative impact on both. Those in the other quadrants involve tradeoffs. The size of each bubble represents the potential of that technology to meet future energy demand.

Key take-away messages from this review:

- Increasing fuel efficiency standards has the potential to make the biggest contribution to meeting our energy needs. In addition, this option has very strong positive implications for both energy security and climate.
- While coal-to-liquids can make a small contribution to increase U.S. energy security in this timeframe, pursuing this option would have significant negative impacts to the climate. Even if most of the CO_2 from the conversion process is captured and stored, climate impacts are still negative compared to petroleum.
- Ethanol from corn would deliver significant new energy and increase U.S. energy security, but would deliver relatively small benefits to the climate. This is due to the

high energy input required to produce and process corn – and the fact that most of this energy is derived from fossil fuel (in particular, coal). Cellulosic ethanol will likely deliver slightly less energy than corn-based ethanol over this timeframe, but has a greater positive impact on climate change on a life-cycle basis.

The options graphed here are not drawn from specific pieces of legislation, nor are they part of an energy forecast. Different policy designs would lead to different placement of "bubbles" on the chart as well as influence the size of the bubbles themselves. Attached is basic background on the chart, and in a separate file, some basic technology descriptions. For specific assumptions, go to **www.wri.org/usenergyoptions**.

Responding to the Climate Challenge

So, if technology and the development of a new energy and transport infrastructure are critical in the fight against global warming, separating the elements of a response is a critical step. Sir Nicholas Stern, in the "Stern Report" issued last fall, comments that:

> *Three elements of policy are required for an effective global response. The first is a price on carbon, implemented through tax, trade or regulation. The second is policy to support innovation and the deployment of low carbon technology. And the third is action to remove barriers to energy efficiency and to inform, educate and persuade individuals of what they can do to respond to climate change."*

We at WRI agree that it will require a carbon price to be enacted by policy makers, that there must be a concerted emphasis on technology deployment, and that individuals and organizations must change their behaviors and find ways they can make a difference.

1) create a carbon price: With a price on carbon, emitters, industry and consumers all have an incentive to change their behavior. The key is to build a program that can drive emissions out of the economy and reward clean technology and changes in behavior. A combination of new, tighter standards offers a variety of environmental benefits, spurs industry innovation, and can create investment in new American jobs, technology and industry. Global markets are emerging for low carbon technology – and countries that have domestic industries calibrated to provide those services will be the winners in the global energy infrastructure and product provision. A carbon price could be implemented through a variety of policies – including a cap and trade program or a carbon tax.

2) focus on technology deployment: Policy is as enabling force – the government sets standards and creates demand for innovation and investment.

The United States can create markets to deliver new technology and a clean and secure future. According to the Cleantech Venture Network, a group that tracks venture flows in to clean technology companies, clean energy investments totaled a $2.9 billion for 2006, representing a 78% increase over 2005 clean technology investment of $1.6 billion, and a 140% increase over 2005 investment of $1.2 billion. In addition, the group also reports there is increasing investment in clean technology as a percentage of overall venture capital. In the fourth quarter of 2006, clean technology ranking third in size as an industry segment (behind software and biotech).

And the growth in these markets is not only for venture capitalists - Citigroup announced last week it will spend $31 of a $50 billion climate change commitment will go toward supporting the "commercialization and growth of alternative energy and clean technology", and Bank of America made a $20 billion pledge for climate change and clean energy investments. For these investments to be successful there must be an active and engaged market in driving emissions and energy consumption down.

3) commit to changing behavior: buyers and consumers of energy and technology can also make a difference. The estimated government percentage of total U.S. commercial and residential building energy consumption comes to about 1.9% - the government itself can help shape the building infrastructure and support a transformation in energy and emissions by taking a leadership role. US government as a building owner/operator/lessee can help bring new a new era of advance building technologies and building energy performance standards. A federal fleet requirement could help bring advanced car technology to scale.

In the area of transportation, the combination of policy, technology and behavioral change will be required. No one piece of this three-legged stool will be adequate. U.S. must look for opportunities for significant, scalable change in its transportation systems and infrastructure as a first step:

Create transit-oriented development (TOD) corridors and improved transit infrastructure: This committee could review and support policies that promote the use of public transportation and authorizing funding to build energy-efficient and environmentally friendly modes of transport like clean buses and light rail. These transportation systems also use less fuel. Currently, only 6-7% of Americans are currently using mass transit like buses and rail to commute. Cities like Portland, OR and Seattle, WA have created efficient busing systems, and the U.S. Department of Transportation could increase grants to state and local governments for TOD corridors, to construct or improve facilities for transit, bicycles, and pedestrians.

Support climate and environmentally friendly fuels and fuel performance standards: It is clear that we are poised to embark on a broad examination of potential transportation fuels to help reduce U.S. oil dependence. Some policies, such as California and other states are interested in developing, focus on the characteristics of the fuel, a "low carbon fuel standard." Other proposed programs pick specific technologies, like ethanol, and seek to overcome the specific technology barriers associated with one fuel. In reviewing the options, water impacts, land-use impacts and infrastructure requirements must be reviewed. For example, coal to liquids technology, profiled in Chart 4, requires significant amounts of water – estimates range up to 10 tons/water for each ton of oil. With both climate and water concerns, this technology may not be a good investment as a long term or scalable fuel source. In the case of ethanol, food vs. fuel debates for current technology may be shorter term if we can quickly move to cellulosic technology. But ethanol cannot be shipped with gasoline, and will require a different distribution system. And Commercial airliners could be burning biofuels derived from algae within five years, Boeing, the world's largest aircraft manufacturer, has said. Yet we have not examined the impacts. We need to link our climate, energy, and water resource challenges and look for comprehensive solutions.

Support automobile fuel economy/performance standards

Contrary to urban myth, since the early 1980s, American automakers have poured technology into new cars. Today's cars get almost twice as many ton-miles per gallon as cars got in the late 1970s, and roughly twice the horsepower for a given fuel economy.

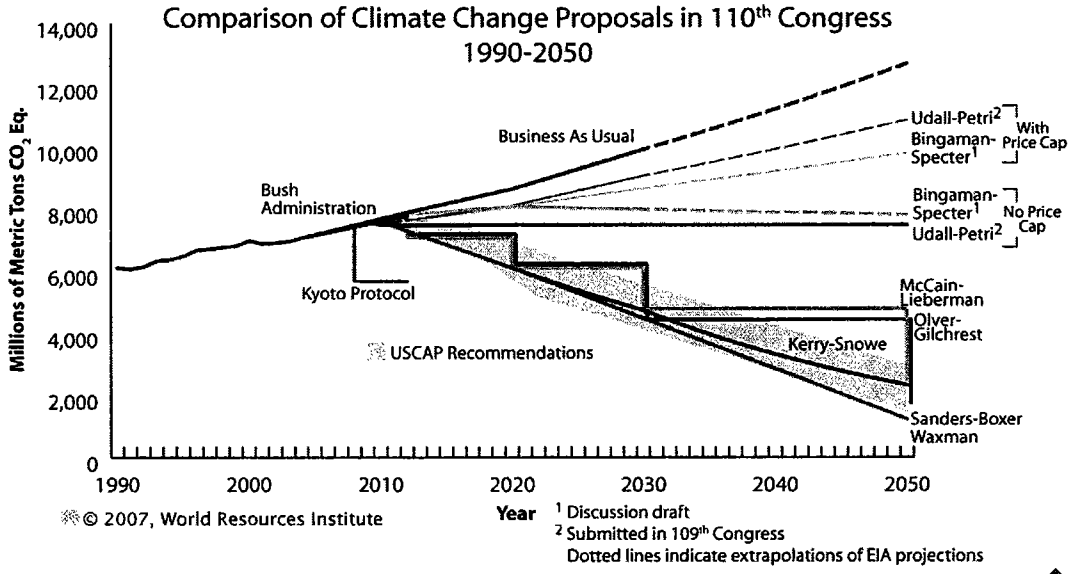
The trouble is that the US auto makers decided to sell size and power, not better gas mileage (others, like Toyota and Honda, bet on a mix of good gas mileage with more power). Now as our oil use for light duty vehicles spirals upwards American automakers tell us it would now cost thousands of dollars per car to make them "fuel efficient.

In the last few years a new option has appeared, the hybrid. It too, could go down the wrong road. The first hybrid models, from Honda and Toyota, truly saved fuel – 40-55 mpg on the road. When larger models, like the Honda Accord hit the market something like half of the hybrid advantage seemed to be used to save fuel and half to increase power. As American companies start offering hybrids, they are focusing on big SUVs that will guzzle a little less gas, but seem again to assume that tomorrow's customers will want size and speed whatever the cost of gasoline or the consequences for the climate.

The key question now is what package of incentives, mandates and assistance will shift US auto makers to the efficiency road they bet against for so many years and enable them to prosper there? In order to solve our fuels problem the first thing we need to do is cut it down to size. I am convinced that the answer must include strong CAFÉ standards.

These are the leadership challenges facing the Transportation and Infrastructure Committee, and Congress. Congress will be reviewing bills that will influence the trajectory of emissions in the United States. **Chart 3** offers a graphical depiction of some of the options in consideration for a cap and trade program.

Chart 3: US CAP Targets and Current Legislative Proposals



As of March 2007

WRI

Your jurisdiction over many of our public works, our federal buildings, our infrastructure means you can craft a clear, compelling and meaningful vision to help us re-invent the energy economy. Congress must look at the investments needed to ensure that our water supply, our infrastructure and our mobility needs can be sustained. We must pursue action by creating a price on carbon, re-directing our mobility efforts to include improved mass transit, implementing technology standards to help U.S. industry innovate and sell low-carbon, advanced technology. These efforts will not only help the U.S. secure its future, it will help our industry compete globally in a carbon and energy constrained world. The U.S. government can lead by example in purchasing efficient technologies and changing its behavior. There is limited time, but there are policy options on the table today. The choice to act is yours.